Astronomy and Astrophysics 2006 vol.447 N2, pages 545-551

Broad band variability of SS433: Accretion disk at work?

Revnivtsev M., Fabrika S., Abolmasov P., Postnov K., Bikmaev I., Burenin R., Pavlinsky M., Sunyaev R., Khamitov I., Sakhibullin N.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

We present broad band power spectra of variations of SS433 in radio, optical and X-ray spectral bands. We show that at frequencies lower than 10 -5 Hz the source demonstrates the same variability pattern in all these bands. The broad band power spectrum can be fitted by one power law down to frequencies ~10-7 Hz with flattening afterwards. Such a flattening means that on time scales longer than ~107 s the source variability becomes uncorrelated. This naturally leads to the appearance of quasi-poissonian flares in the source light curve, which have been regularly observed in radio and optical spectral bands. The radio flux power spectrum appears to have a second break at Fourier frequencies ~10-5 Hz which can be caused by the smearing of the intrinsic radio variability on timescale of the light-crossing time of the radio emitting region. We find a correlation of the radio and optical fluxes of SS433 and the radio flux is delayed by about ~2 days with respect to the optical one. Power spectra of optical and X-ray variabilities continue with the same power law from 10 -7 Hz up to ~0.01-0.05 Hz. The broad band power spectrum of SS433 can be interpreted in terms of self-similar accretion rate modulations in the accretion disk proposed by Lyubarskii (1997, MNRAS, 292, 679) and elaborated by Churazov et al. (2001, MNRAS, 321, 759). We discuss a viscous time-scale in the accretion disk of SS433 with reference to the observed broad band power spectrum. © ESO 2006.

http://dx.doi.org/10.1051/0004-6361:20052755

Keywords

Accretion, accretion disks, Black hole physics, Instabilities, Stars: binaries: general, X-rays: general, X-rays: stars